IX. Recognition and Management of Diarrhea and Dehydration

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Goals and Objectives for Diarrhea and Dehydration Module

I. **Goal**—Participants will understand the therapeutic approach to the treatment of diarrhea and dehydration in the developing world and appreciate the rationale behind this approach.

Objectives—Participants will be able to:

a) describe the history behind our current therapies for treating diarrhea and dehydration
b) explain the physiologic basis for the efficacy of oral rehydration solutions (ORS)
c) List the reasons why using ORS in the majority of cases is preferable to parenteral therapy
d) specify under what circumstances oral rehydration therapy (ORT) is indicated and when it is not.

II. **Goal**—Participants will be able to appreciate the variety of ORS formulations available, the rationale behind these formulations, and when one form or the other might be preferable.

Objectives—Participants will be able to:

a) list the 4 basic components of WHO ORS and their concentration
b) give examples of different formulations other than WHO ORS and the rationale as to why they might be beneficial over WHO ORS
c) given the appropriate supplies, be able to mix a field expedient form of ORS
d) explain when "straight" WHO ORS is appropriate and when its intake should be modified

III. **Goal**—Participants will be able to assess an individual patient and determine what form of fluid therapy should be initiated, how much to be given, and how to formulate an overall outpatient treatment plan.

Objectives—Participants will be able to:

a) list the physical findings that might correlate with differing degrees of dehydration
b) specify why and when these physical findings can be unreliable
c) identify the indications for starting intravenous fluids (IVF) vs. ORS
d) given a hypothetical caregiver in the developing world, describe how one would instruct this person to mix and administer ORS, how and what to feed the child, and how and when to follow-up.

IV. **Goal**—Participants will understand the importance of early refeeding, continued breastfeeding, as well as the cultural obstacles to following through with therapy.

Objectives—Participants will be able to:

a) explain why continued feeding is important in the majority of cases of dehydration
b) state the benefits of breast vs. bottle feeding in the developing world
c) give examples of cultural impediments to implementing therapy.

V. **Goal**—Participants will learn the rules of drug therapy for the treatment of diarrhea.

Objectives—-Participants will be able to:

a) explain why anti-motility agents and indiscriminate use of antibiotics is contraindicated
b) state under what circumstances antibiotic therapy might be indicated
c) list two parasitic causes of diarrhea in which anti-parasitic drugs should be started.

VI. **Goal**—Participants will appreciate the practical aspects of ORT implementation in the refugee camp setting.

Objectives—Participants will be able to:

a) outline a strategy for ORT unit set-up at the outset of a humanitarian emergency
b) state what personnel one would need to begin implementation of ORT to patients and what skills these personnel should have
c) list the supplies one would need to set up an ORT unit in a field setting
d) Educate ancillary personnel in evaluating patients with diarrheal disease using standardized treatment protocols.
e) Understand how surveillance data is utilized in assessing the epidemiology of diarrheal disease.

Management of Diarrhea and Dehydration in Humanitarian Emergencies

SCOPE OF THE PROBLEM

Worldwide, an estimated 4 million children under five years of age die every year from diarrheal disease, the overwhelming majority of these children being less than two years old. In a refugee situation involving large populations of displaced persons, diarrheal illness and its resultant dehydration becomes an even more significant cause of morbidity and mortality, in some cases comprising greater than 50% of the mortality in the initial stages of a humanitarian emergency. Although the root cause of diarrheal disease in these situations can often be linked directly to a lack of access to a clean and adequate water supply, poor sanitation stemming from overcrowding, and increased susceptibility due to malnutrition, this module will focus predominately on the therapy of the dehydration that can be the common result of untreated diarrheal disease regardless of its etiology.

TREATMENT STRATEGY

The major difference between treatment of diarrheal disease in the developing world and that utilized by most health care providers in the U.S. and other industrialized countries lies in the relative use of oral rehydration therapy (ORT). Over the past thirty years, ORT has proven to be a safe and effective treatment for dehydration caused by diarrheal illness around the world, and has been documented to dramatically reduce the mortality associated with diarrheal outbreaks such as those seen in humanitarian emergencies. During the 1971 Bangladesh War of Liberation, when cholera was present in epidemic proportions, there was a 25% mortality rate from diarrheal illness when IV therapy was the only treatment utilized. When ORT was introduced in this first widespread utilization of this form of therapy, the mortality rate subsequently dropped to 3 percent.

In a refugee situation, ORT is clearly the preferred form of rehydration and maintenance therapy versus that of intravenous fluid in the overwhelming majority of cases for the following reasons:

1. ORT is safe, simple, and inexpensive. Its main ingredients—salt, water, and sugar or starchy foods—are often present in the community even if premixed oral rehydration salts (ORS) are not readily available.

2. ORT can easily be taught to health workers and ancillary support staff, thereby freeing up the reliance on medical and hospital based personnel. These individuals can subsequently educate the community in its use at home or within the refugee camp setting.

3. ORT can be used not only to treat dehydration but to prevent it as well if it is made available and instructed to be utilized early in the course of the diarrheal episode.

HISTORICAL BACKGROUND

Despite references to forms of ORT in a variety of different cultures dating back thousands of years, our current understanding of fluid therapy in diarrheal disease, and ORT in particular, is fairly recent.

3000-1000 B.C. – Folk remedies (washed rice and honey, salt and molasses).

1832 – First global cholera pandemic. IV therapy introduced by Latta.

1930's – Hartman uses lactate in IV solution to prevent acidosis.

1940's – First oral rehydration solutions developed by Harrison and Darrow

1950's - early 1960's – Phillips and Wallace at US NAMRID in Taiwan evolve modern IV therapy for cholera patients based on electrolyte content of cholera stools.

1964 – Glucose-sodium co-transport mechanism characterized. Phillips and Wallace use ORT at US NAMRID in Taiwan.

1965 – 1970 – ORT developed further at Pakistan-SEATO Cholera Research Laboratory, Dhaka and Johns Hopkins University International Center for Medical Research and Training, Calcutta.

1971 – 1973 – ORT used successfully on large scale in cholera outbreak in Bangladesh by Mahalanabis and colleagues.

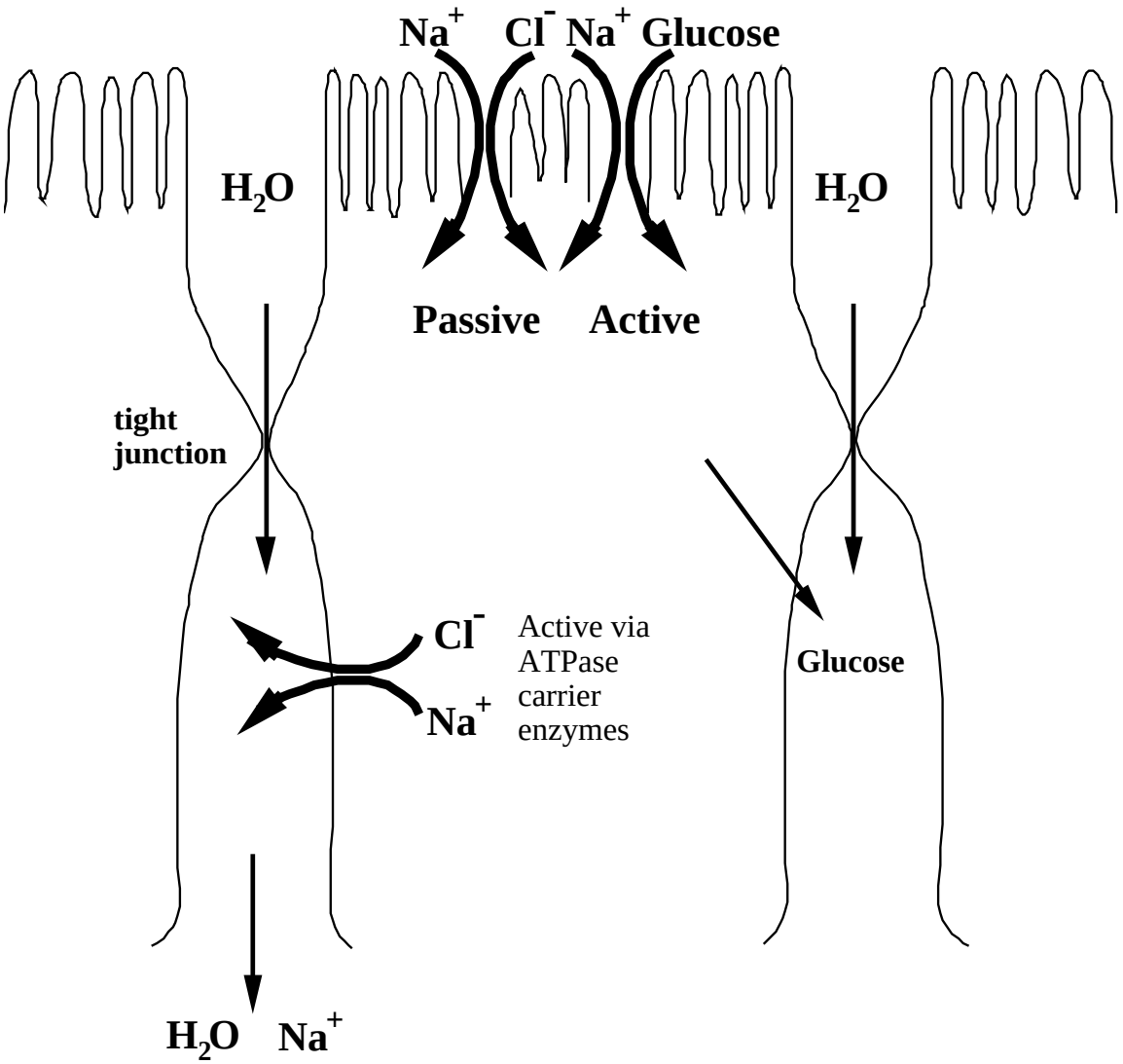
1975 – WHO and UNICEF promote a single solution (WHO ORS) for worldwide use.

1980 – WHO initiates Diarrheal Diseases Control Program in effort to promote global use of ORT.

HOW DOES ORT WORK?

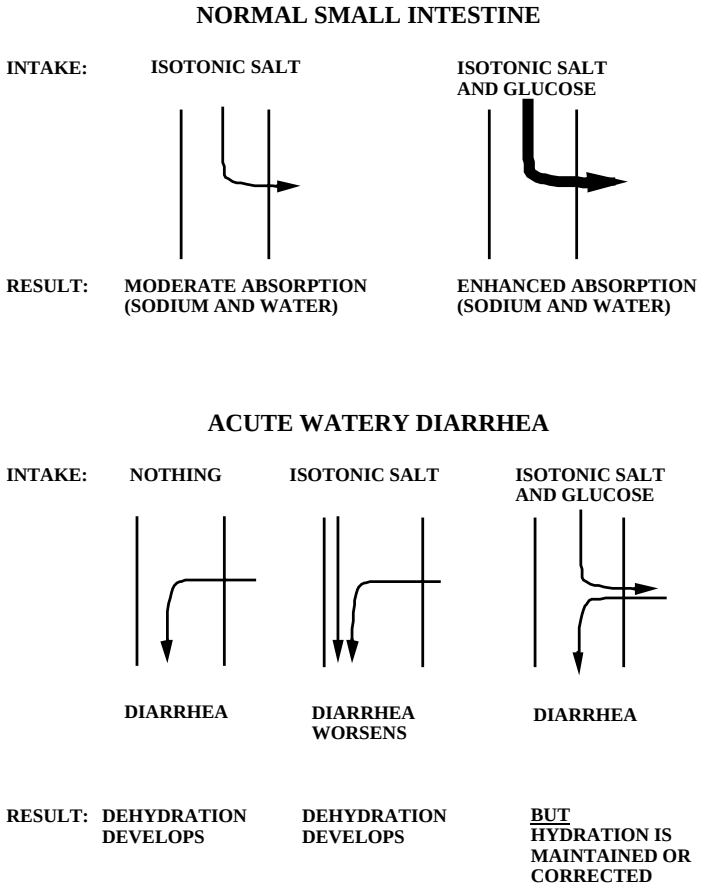
The physiologic basis behind our current understanding of modern ORT stems from the discovery in the early 1960's of the sodium-glucose co-transport system mentioned above. Under normal physiologic conditions, water is absorbed osmotically across the small bowel through "tight junctions" between epithelial cells due to a sodium gradient that is maintained by two mechanisms: passive sodium/potassium diffusion across the brush border membrane and active co-transport of sodium, along with monosaccharides such as glucose, also across the lumenal membrane. The resulting intracellular sodium is then actively transported via ATPase carrier enzymes into the intercellular space, setting up an osmotic gradient between the intercellular and lumenal spaces, allowing for free diffusion of water.

Figure 1.



The efficacy of ORT is based on the fact that in acute diarrhea, the passive absorptive mechanism of sodium and chloride is impaired, but glucose absorption remains largely intact, so as long as one provides adequate glucose, or as was later discovered other sugars like galactose and even amino acids, sodium can continue to be absorbed across the lumenal membrane and then extruded into the intercellular space, setting up the osmotic gradient for water, as well as electrolytes like potassium and bicarbonate present in isotonic glucose-salt solutions, to be absorbed as well. This absorptive capacity can equal or exceed simultaneous stool losses even when the loss is rapid, as is seen in cholera.

Figure 2.



INDICATIONS FOR PARENTERAL THERAPY

After its widespread use around the world in millions of cases over the last 30 years, it is clear that ORT can be utilized to treat the overwhelming majority of adults, children, and infants with dehydration due to diarrheal disease, as well as to prevent dehydration from occurring; however, parenteral therapy should be available in all hospital settings, but reserved for those patients with any of the following:

1. **Patients who present acutely with severe dehydration** (hypotension, shock, stupor, or coma). After initial fluid repletion, if the patient is moderately or mildly dehydrated, ORT should be initiated. Likewise, if evidence of intestinal ileus is present, e.g. abdominal distention and/or absent bowel sounds, ORT should be withheld and IV fluids initiated until these signs are absent.

2. **Patients with severe and protracted vomiting.** The great majority of children with mild or moderate degrees of vomiting associated with their diarrheal illness can successfully tolerate ORT when given slowly by spoon or syringe.

3. **Patients with excessively high stool output.** Rates of stool output greater than 10 cc/kg/hr, or 800 ml in an adult, are usually only seen in severe cholera cases. IV fluids should be initiated without delay in these patients; however, ORT should never be denied simply because of high stool output.

4. **Patients with evidence of serious glucose malabsorption.** Glucose malabsorption can occur in anywhere from one to five percent of cases of diarrheal disease, depending on the population. The diagnosis is made on the basis of glucose or positive reducing substances in the stool **in combination with** a dramatic increase in stool output when ORS is given. When IV fluids are started, these patients show an immediate drop in stool output.

COMPOSITION OF ORS

The first successful formulations of ORT were designed specifically to replace the fluid losses associated with cholera. Many critics, particularly in the U.S., were skeptical that one oral solution designed for severe, secretory diarrhea such as that seen in cholera where stools can contain upwards of 120 –140 mmoles/L of sodium, could be successfully utilized for non-cholera diarrhea. In 1975, the World Health Organization (WHO) and the United Nations International Children's Fund (UNICEF) decided to promote a single solution worldwide. The formula for this solution is as follows:

Glucose	20 grams
Sodium chloride	3.5 grams
Sodium bicarbonate (since changed to 2.9 grams trisodium citrate dihydrate for increased shelf life)	2.5 grams
Potassium chloride	1.5 grams
Water	1.0 liter

The concentration of this solution (in mmoles/L) is sodium, 90; potassium, 20; chloride, 80; base, 30; and glucose 111 (2%). This formulation was the result of a compromise between a solution tailored for the high stool sodium losses seen in cholera and the smaller losses seen in other forms of diarrhea such as that caused by rotavirus or enterotoxigenic *E. coli*. Despite the fact that rotavirus is known to cause a diffuse enteropathy that can

be sometimes associated with glucose malabsorption, this WHO/UNICEF form of ORS has proven to be efficacious regardless of etiology to include diarrheal disease caused by rotaviral infection.

Table 1.

Fecal Electrolyte Concentrations in Infectious Diarrhea (meg/L)

Disease	Na	Cl	K	Bicarbonate
Rotavirus	37	22	38	6
ETEC	53	24	57	18
Cholera (Infants and Children)	88	86	30	32
Cholera (Adults)	140	104	13	44

Data from Molla et al. (1981) and Pierce et al. (1968).

Likewise, initial skepticism that a solution so high in sodium could be used in hypernatremic, hyponatremic, as well as isonatremic dehydration has proven to be largely unfounded as long as renal function is unimpaired.

In spite of the fact that WHO ORS has been so successfully utilized, it still does not reduce the duration of illness or the volume of stool output in patients with diarrhea. Over the past twenty years, a significant amount of research has been done in an attempt to improve on WHO ORS. The goal has been to devise a solution that not only treats and prevents dehydration, but one that reduces the severity and duration of the diarrhea as well. Essentially three categories of "super ORS" have been studied: ORS containing amino acids as the co-transporting molecules, ORS derived from cooked cereals, usually rice-based, and glucose-based ORS made hypoosmolar by reducing the concentration of glucose and sodium. Of these three alternative types of ORS, the rice-based formulations have uniformly demonstrated improved efficacy in both children and adults with cholera over that of standard WHO ORS in regards to decreased duration and volume of stool output, with a minimal to no significant change observed in patients with non-cholera diarrhea. The glucose-based hypoosmolar formulations have been shown to be more effective than WHO ORS in children with non-cholera diarrhea; however, although it is mildly more effective in adults with cholera, there have been case reports of significant hyponatremia developing in some of these patients when hypoosmolar solutions were used.

For now, the most readily available and standardized form of ORS worldwide continues to be the original WHO/UNICEF formulation, although this may change. The following is a list of commercially available ORS formulations in the United States. Keep in mind that diarrhea in the U.S. is rarely caused by cholera, and that viral etiologies such as rotavirus are more common; therefore, rehydration solutions with sodium concentrations in the 60 to 75 mmol/L range have been recommended by many authorities for children with diarrhea in this country.

Table 2.

ORT solution	Na (mmol/L)	K (mmol/L)	Osmolality (mmol/L)	Base [a] (mmol/L)	Carbohydrate [b] (g/L)	Calories (kcal/L)
Pedialyte	45	20	250	30	25	100
Pediatric Electrolyte	45	20	250	30	25	100
Kao Lectrolyte	50	20	232	30	20	80
Infalyte	50	25	200	50	13	50
Ceralyte-50,70,90	50,70,90	20	180,220,260	30	40	165
Rehydralyte	75	20	310	30	25	100
Rice Based ORS (Homemade)	90	20	~230	30	50	200
WHO ORS	90	20	310	30	20	80

[a] Bicarbonate or citrate
[B] All the Commercial ORT solutions except Ceralyte contain glucose. Ceralyte contains a complex mixture of rice carbohydrates and proteins.

FIELD EXPEDIENT FORMS OF ORS

Despite the clear need for readily available ORS in almost any humanitarian emergency, recent military deployments such as Operation Provide Comfort did not include the provision of any ORS until well in to the mission. The ability to provide a field expedient form of ORS in such instances may be life-saving. Examples include the following:

ORS mixed from readily available IV solutions:

Normal Saline	390 ml
D5W	400 ml
KCl (2 meq/ml)	10 ml
NaHCO3 (1 meq/ml)	30 ml
Water	170 ml

Mix together to form one liter of solution.

ORS From Table Sugar and Salt

Sucrose (table sugar)	9 level teaspoons
Table Salt	1/2 teaspoon
Sodium Bicarbonate (baking soda)—if available	1/2 teaspoon
Potassium Chloride--if available*	1/4 teaspoon
Water	1 liter

*If no potassium chloride is available, attempt to supplement with potassium-rich foods like bananas, tomatoes, or oranges.

ORS Made From Ricewater

Uncooked Rice	100 grams
Water	1 liter

Cook the rice in boiling water for 10 minutes or until the rice pops. Drain the water from the rice into a container, squeezing any remaining water from the rice with a spoon. When all the water is squeezed from the rice, add enough water to the solution to bring the total volume to one liter.

In all cases, use as clean and potable a water source as is available. Whether to use scarce energy resources to boil suspect water will be a judgment call based on a variety of factors. Families should certainly be told **not** to boil OR solution after it is mixed, since this will obviously increase the electrolyte and sugar concentrations, potentially to dangerous levels. If at all possible, a new batch should be made at least every 24 hours in the absence of refrigeration. Camp workers and family members should be instructed to discard any unused solution after 24 hours since it can be an excellent bacterial medium. If dispensing containers are available, it may be advantageous to pre-mix a 24 hour supply of solution for the individual and have them return the next day for re-evaluation and more solution if needed.

CASE MANAGEMENT

If possible, an accurate body weight should be obtained on all patients. Premorbid weights are often not available in a refugee situation, so reliance on physical findings in estimating fluid deficits is crucial. Mental status and urinary output are particularly valuable clinical signs in assessing severity of dehydration. Skin turgor can sometimes be misleading in malnourished populations; for example, marasmus is usually associated with decreased skin elasticity even in the absence of dehydration, whereas obese infants may not show decreased skin elasticity even in the presence of moderate dehydration.

In addition to assessing the degree of dehydration present, it is important to do a full physical examination as well to rule out any co-morbid conditions. Also, one must always auscultate and document active bowel sounds prior to initiating oral therapy.

Adapted from MMWR October 1992.

Table 3.

Degree of dehydration	Signs	Rehydration therapy (within 4 hrs)	Replacement of fluid losses from stool / emesis	Dietary therapy
Mild (3% - 5 %)	Slightly dry buccal mucous membranes, increased thirst	ORS 50 ml/kg	40 ml/kg or 1/2 -1 cup of ORS for each diarrheal stool 2 ml/kg for each epsisode of emesis	Human milk feeding, or half or full strength lactose containing milk or undiluted lactose free formula
Moderate (6% - 9%)	Sunken eyes, sunken fontanelle, loss of skin turgor, dry buccal mucous membranes	ORS 100 ml/kg	Same as above	Same as above
Severe (>10%)	Signs of moderate dehydration with one or more of the following: rapid thready pulse, cyanosis, cold extremities, rapid breathing, lethargy, coma	Intravenous fluids (Ringer's lactate), 20 ml/kg/hr until pulse, perfusion, and mental status return to normal; then 50 - 100 ml/ kg of ORS	Same as above	Same as above

In most cases, preferably a spoon or syringe should be utilized since this decreases the potential for drinking too fast which frequently results in vomiting. Avoid the use of bottles because of sterilization problems and the interference it may impose on breastfeeding. In a vomiting child it is often helpful to start off by giving one teaspoon

per minute, gradually increasing the volume as tolerated. After two to four hours, hydration status should be reassessed. If the patient has been rehydrated adequately, maintenance therapy can begin; if the patient is still dehydrated, the deficit should be re-estimated and rehydration started again.

For patients with acute diarrhea but no clinical signs of dehydration, the rehydration phase of therapy is omitted and maintenance therapy is started immediately. This maintenance therapy can be performed at home or away from the treatment facility after parental instructions are given.

In all cases, once maintenance therapy is started, it is important to realize that WHO ORS in its "straight" form was designed to restore the fluids and electrolytes lost during the acute course of diarrheal illness. **For maintenance therapy and prevention of dehydration, WHO ORS should be supplemented with an approximately equal volume of breastmilk, water, or other fluid.** Maintenance therapy can be calculated in a number of ways. A standard formulation familiar to most pediatricians is the following: 100 ml/kg for the first 10 kg of body weight, 50 ml/kg for the second 10 kg, and 20 ml/kg for every kg of body weight thereafter. Additionally, replacement fluids should be given for each episode of stool and emesis as described in Table 3.

NUTRITIONAL THERAPY

It is important to realize that nutritional therapy in the long run can be just as crucial if not more so than the ongoing fluid therapy to the overall health of the child with diarrheal disease. In many parts of the developing world, children experience on average between 7 and 10 episodes of diarrhea per year. The effect of fasting during these episodes can precipitate or in many cases exacerbate a tendency towards malnutrition that can be devastating. Besides this larger consequence of fasting, on the physiologic level it has been demonstrated that lack of food intake during diarrheal episodes inhibits the enterocyte renewal process and prolongs the intestinal permeability seen in acute infection. Mistaken beliefs that fasting is beneficial are just as prevalent if not more so in many developing countries as it is in the U.S.

As soon as the rehydration phase is completed, dietary therapy should begin. Breastfed infants should continue to nurse on demand. **Remember that in most refugee situations, a paucity of potable water and an inability to clean bottles, in addition to the hazards of inappropriate mixing and storage and the potential undermining of breastfeeding, make formula feeding in most of these situations particularly undesirable**. If formula feeding is deemed absolutely necessary, however, these infants can receive full strength formula, lactose-reduced, or lactose free formula, depending on availability and tolerance. The clinical significance of transient lactase deficiency in acute diarrhea is probably overstated, but if symptoms truly worsen on full strength

formula, then dilute or lactose free formula should be attempted. Older children can receive solid foods as tolerated. Starches, cereals, yogurt, fruits, and vegetables, should be encouraged. Foods high in simple sugars and fats should be avoided.

CULTURAL OBSTACLES TO CARE

In addition to the common practice of fasting during diarrheal episodes, there are many other potential cultural obstacles to care of the child with diarrhea. Health beliefs and practices are important in devising a treatment plan that is acceptable to the family, and it is important to attempt to find out what some of these beliefs might be. In some Asian cultures, for example, the body is considered to be made up of "hot" and "cold" forces. Diarrhea may be considered a "hot" illness, and therefore "cold" foods are encouraged to bring the body into balance; this may affect how one would introduce ORS into therapy. In Islamic cultures, it may be helpful to emphasize the Koranic charge to breastfeed for two years. During religious fasting months, emphasize that the child with diarrhea should be exempt from fasting. In some Latin American cultures, a sunken fontanelle is considered the cause of diarrhea, and some mothers may actually suck on the fontanelle to stop the diarrhea. In some African as well as Latin American societies, fathers are not expected to be involved in the day to day care of children, and with a sick, absent, or busy mother, the child may suffer adversely. Here in the U.S., the common practice of using sports drinks, gelatin, and "flat" soda to treat diarrheal disease is yet another example of a cultural practice that may actually exacerbate the problem. **The main point is to be aware of these potential obstacles to care and incorporate them into your teaching and treatment plans.**

DRUG THERAPY FOR DIARRHEA

WHO has estimated that 50% to 70% of diarrheal episodes worldwide are treated with antimicrobial and/or anti-secretory/bulking agents. A survey in 47 countries performed by WHO in 1990 showed that drug therapy was used in diarrheal illness twice as often as ORT, much of it prescribed by health professionals. It is important to remember what most pediatricians have already been taught: **the natural history of the overwhelming majority of acute gastroenteritis is that the diarrhea will stop by itself.** In most cases, antibiotics are not indicated and can actually be harmful by worsening diarrhea and causing antibiotic-associated colitis. Simple rules to remember and teach allied health workers when treating diarrheal disease are the following:

1. Antibiotics should only be used for dysentery and suspected cholera.

2. Anti-parasitic drugs should be only used for amoebiasis and giardiasis.

3. Do not use anti-diarrheal drugs or anti-emetics; they can decrease gut motility, prolong the course of diarrhea, and worsen systemic symptoms.

Remember that in most refugee camp set-ups, bacterial cultures will not be available.

Even when obtainable, results may not be ready for two to three days, by which time most cases of diarrhea will have resolved. In spite of the expense of bacterial cultures (40 to 50 times that of ORT for an average child), if resources allow, they should be obtained in cases of suspected dysentery (e.g. bloody diarrhea), or when cholera is being thought of as a possible etiology.

ORGANIZATION OF ORT UNITS IN THE CAMP SETTING

In the early phases of a humanitarian emergency, the organization and set-up of ORT units can be easily overlooked, particularly when there is no obvious outbreak of diarrheal disease. It is important to remember that **early rehydration is the most important treatment for preventing death from diarrheal disease**, and therefore ORT units should be set up at the outset of almost every emergency relief situation. If possible, an ORT unit should be placed at each health post where patients will be seen, from the smallest tent clinic to the largest hospital. If trained personnel are not available, then a separate area in the main treatment facility should be reserved for ORT set-up; ancillary personnel should then be expeditiously trained in the administration of ORT, and further ORT units set up at remaining triage and treatment areas in an effort to decentralize accessibility and increase availability. These smaller units should be manned by one to two people who have been trained in recognizing the various forms of dehydration and the algorithms for treatment (see appendix 2). Personnel at these units should be able to detect serious cases, such as suspected dysentery, cholera, or severe dehydration, and refer them rapidly to the central treatment facility, while at the same time ensuring adequate rehydration for milder cases throughout the day. An adequate amount of potable water, ORS packets, mixing containers, and syringes, spoons, and cups sufficient to treat about 50 patients a day, depending on the situation and resources, should be available at each ORT station. Recording of data is essential for surveillance purposes and can be accomplished by using a chart similar to the one in appendix 1. A chart such as this should be utilized by non-physician personnel evaluating and treating patients at these stations.

Appendix 1.

Data Collection Chart

Name	**Location**	**Age**	**Duration of Diarrhea**	**Suspected Cholera (vomiting, abdominal cramping, voluminous stools, abrupt onset)**	**Suspected Dysentary (Blood)**	**Dehydration Severity & Treatment Algorithm** Mild (Plan A)	Moderate (Plan B)	Severe (Plan C**)**

Appendix 2

FIRST, ASSESS YOUR PATIENT FOR DEHYDRATION

	A	**B**	**C**
1. LOOK AT: CONDITION	Well, alert	**Restless, irritable**	***Lethargic or unconscious; floppy***
EYES	Normal	Sunken	Very sunken and dry
TEARS	Present	Absent	Absent
MOUTH/TOUGUE	Moist	Dry	Very dry
THIRST	Drinks normally; not thirsty	***Thirsty, drinks eagerly***	***Drinks poorly or not able to drink***
2. FEEL: SKIN PINCH	Goes back quickly	***Goes back slowly***	***Goes back very slowly***
3. DECIDE	The patient has NO SIGNS OF DEHYDRATION	If the patient has two or more signs including at least one ***sign***, there is SOME DEHYDRATION	If the patient has two or more signs, including at least one ***sign***, there is SEVERE DEHYDRATION
4. TREAT	Use Treatment Plan A	Weigh the patient, if possible, and use Treatment Plan B	Weight the patient and use Treatment Plan C URGENTLY

Appendix 2.

WHO DIARRHEA MANAGEMENT CHART PLAN A (MILD DEHYDRATION)

Treating Diarrhea at Home

Use this plan to teach the mother to
- continue to treat at home her child's current episode of diarrhea
- give early treatment for future episodes of diarrhea

Three rules for treating diarrhea at home

Give the child more fluids than usual to prevent dehydration
- use a recommended home fluid such as cereal gruel. If this is not possible give plain water. Use ORS solution for children described in the box below.
- give as much of these fluids as the child will take. Use the amounts shown below for ORS as a guide.
- continue giving these fluids until the diarrhea stops.

Give the child plenty of food to prevent undernutrition.
- Continue to breast feed frequently.
- If the child is not breast fed, give the usual milk. If the child is less than 6 months old and not yet taking solid food, dilute milk or formula with an equal amount of water for 2 days.
- If the child is 6 month or older, or already taking solid food:
  -also give cereal or another starchy food mixed, if possible, with pulses, vegetables, and meat or fish. Add 1 or 2 teaspoons of vegetable oil to each serving
  - give fresh fruit juice or mashed banana to provide potassium
  - give freshly prepared foods. Cook or grind meat well
  - encourage the child to eat, offer food at least 6 times a day
  - give the same foods after diarrhea stops, and give an extra meal each day for two weeks.

Take the child to a health worker
If the child does not get better in 3 days or develops any of the following:
- many watery stools
- repeated vomiting
- marked thirst
- eating or drinking poorly
- fever
- blood in the stool

Treatment with ORS Solution
Children should be given ORS solution at home, if
- they have been on treatment plan B or C
- they can not return to the health worker
  if the diarrhea gets worse
- it is national policy to give ORS to all children who see a health worker for diarrhea

Appendix 2 (cont.)

Application of ORS Solution		
Age	Amount of ORS to give after each loose stool	Amount of ORS to provide for use at home
less than 24 months	50-100 ml	500ml/d
2 to 10 years	100 -200 ml	1000 ml/d
10 years or more	As much as wanted	2000 ml/d
Describe and show the amount to be given after each stool using a local measure		

Show the mother how to mix ORS and how to give ORS

- give a teaspoonful every 1 to 2 minutes for a child under 2 years
- give frequent sips from a cup for an older child
- if the child vomits wait 10 minutes, then give the solution more slowly (e.g. a spoonful every 2 to 3 minutes)

if diarrhea continues after the ORS packets are used up, tell the mother to give other fluids as described in the first rule above or return for more ORS

Appendix 2 (cont.)

WHO DIARRHEA MANAGEMENT CHART PLAN B (MODERATE DEHYDRATION)

Approximate amount of ORS solution to give in the first 4 hours						
Age	less than 4 mo	4 -11 mo	12 -23 mo	2-4 yrs	5-14 yrs	15 yrs or older
Weight (kg)	less than 5	5-7.9	8 -10.9	11-15.9	16-29.9	30 or more
Vol (ml)	200-400	400-600	600-800	800-1200	1200-2200	2200-4000

- If the child wants more ORS than shown, give more
- encourage the mother to continue breast feeding
- for infants under 6 months who are not breastfed, also give 100-200 ml clean water during this period
- Use the patients age only when you do not know the weight.

Observe the child carefully and help the mother give ORS solution

- show her how much solution to give her child
- show her how to give it--a teaspoonful every 1-2 minutes for a child under 2 yr, frequent sips from a cup for an older child
- check from time to time to see if there are problems
- if the child vomits, wait 10 min and then continue giving ORS, but more slowly, for example, a spoonful every 2-3 minutes
- if the child's eyelids become puffy, stop ORS and give plain water or breast milk. Give ORS according to Plan A when the puffiness is gone

Continuation of treatment

After 4 hours, reassess the child using assessment chart, then select Plan A, B, or C to continue treatment

- if there are no signs of dehydration, shift to Plan A. When dehydration has been corrected, the child usually passes urine and may be tired and fall asleep.
- if signs indicating some dehydration are still present, repeat Plan B, but start to offer food, milk, and juice as described in Plan A
- if signs indicating severe dehydration have appeared, shift to Plan C

If the mother must leave before completing treatment Plan B

- show her how much ORS to give to finish the 4 hour treatment at home
- give enough ORS packets to complete rehydration, and for 2 more days as shown in Plan A
- show her how to prepare ORS solution
- explain to her the three rules in Plan A for treating her child at home
  - -to give ORS or other fluids until diarrhea stops
  - -to feed the child
  - -to bring the child back to the health worker, if necessary

Appendix 2 (cont.)

WHO DIARRHEA MANAGEMENT CHART PLAN C (SEVERE DEHYDRATION)

Follow the arrows. If answer is YES go across. If NO go down.

Can you give IV fluids immediately?

Yes →

No ↓

start IV fluids immediately. If the patient can drink, give ORS by mouth while the drip is set up. Give 100 ml/kg Ringer's Lactate Solution (or, if not available, normal saline), divided as follows:

Age	First give 30 ml/kg in	Then give 70 ml/kg in
Infants (under 12 mo)	1 hour	5 hours
Older	30 min	2 1/2 hours

Repeat once if radial pulse is still very weak or not detectable

Is IV treatment available nearby (within 30 minutes)?

- reassess the patient every 1-2 hours. If hydration is not improving, give the IV drip more rapidly.
- also give ORS (about 5 ml/kg/hr) as soon as the patient can drink: usually after 3-4 hours (infants) or 1-2 hours (older patients).
- after 6 hours (infants) or 3 hours (older patients), evaluate the patient using the assessment chart. Then choose the appropriate Plan (A, B, or C) to continue treatment.

Yes →

No ↓

- send the patient immediately for IV treatment.
- if the patient can drink, provide the mother with ORS solution and show her how to give it during the trip.

Are you trained to use nasogastric (NG) tube for rehydration?

Yes →

No ↓

- start rehydration by tube with ORS solution: give 20 ml/kg/hr for 6 hours (total of 120 ml/kg).
- reassess the patient every 1-2 hours:

-if there is repeated vomiting or increasing abdominal distention, give the fluid more slowly.

-if hydration is not improving after 3 hours, send the patient for IV therapy.

- after 6 hours, reassess the patient and choose the appropriate treatment plan.

Can the patient drink?

Yes →

No ↓

- start rehydration with ORS solution: give 20 ml/kg/hr for 6 hours (total of 120 ml/kg).
- reassess the patient every 1-2 hours:

-if there is repeated vomiting, give the fluid more slowly

-if hydration is not improving after 3 hours, send the patient for IV therapy.

- after 6 hours, reassess the patient and choose the appropriate treatment plan.

URGENT! Send the patient for IV or NG treatment

Appendix 2 (cont.)

THEN, FOR OTHER PROBLEMS

ASK ABOUT BLOOD IN THE STOOL	**IF BLOOD IS PRESENT:** • **Treat for 5 days with an oral antibiotic recommended for Shigella in your area.** • **Teach the mother to feed the child as described in Plan A.** • **See the child again after 2 days if:** **-under 1 year of age** **-initially dehydrated** **-there is still blood in the stool** **-not getting better** • **If the stool is still bloody after 2 days, change to a second oral antibiotic recommended for Shigella in your area. Give for 5 days.**

ASK WHEN THIS EPISODE OF DIARRHEA BEGAN	**IF DIARRHEA HAS LASTED AT LEAST 14 DAYS:** • **Refer to hospital if:** **-the child is under 6 months old** **-dehydration is present. (Refer the child after treatment of dehydration).** • **Otherwise, teach the mother to feed her child as in Plan A, except:** **-give only half the usual amount of milk, or replace milk with a fermented milk product, such as yogurt.** **-assure full energy intake by giving 6 meals a day of thick cereal and added oil, mixed with vegetables, pulses, meat, or fish.** • **Tell the mother to bring the child back after 5 days:** **-if diarrhea has not stopped, refer to hospital.** **-if diarrhea has stopped, tell the mother to:** **-use the same foods for the child's regular diet.** **-after 1 more week, gradually resume the usual animal milk.** **-give an extra meal each day for at least 1 month.**

LOOK FOR SEVERE MALNUTRITION	**IF THE CHILD HAS SEVERE MALNUTRITION:** • **Do not attempt rehydration; refer to hospital for management.** • **Provide the mother with ORS solution and show her how to give 5 ml/kg/hr during the trip.**

Appendix 2 (cont.)

ASK ABOUT FEVER AND TEMPERATURE	**IF THE CHILD IS UNDER 2 MONTHS OF AGE:** • **Rehydrate as necessary. If there is fever (38°C or above) after rehydration, refer to hospital. Do not give acetaminophen or an antimalarial.** **IF THE CHILD IS 2 MONTHS OF AGE OR OLDER:** • **If temperature is 39°C or above, give acetaminophen.** • **If there is falciparum malaria in the area, and the child has any fever (38°C or above) or history of fever in the past 5 days, give an antimalarial (or manage according to your malaria program recommendation).**